Space Weather Technical Forecast

Issued on Wednesday, 20 October 2021 at 01:05 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: No significant activity expected.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was Very Low, with only A-class flares detected. The one numbered sunspot region on the visible disc at present, 2886 (Hsx/Alpha), is located in the far southeast quarter, and appears to be stable with a magnetically simple configuration.

No Earth-directed CMEs (coronal mass ejections) were observed in available imagery at the time of issue. However, a faint CME that was associated with a weak filament lift off from near N30W10 at 17/0739 UTC has been re-analysed. Model results show a possible small chance of a weak side glance around 20/2300UTC, but confidence is low and no significant impacts are expected.

Solar Wind / Geomagnetic Activity: Solar wind parameters, as measured by DSCOVR at L1, were at mostly slow-ambient levels, 340 to 400 km/s, with a brief peak of 420km/s around 19/1300UTC. Density values were mainly above average, with several peaks near 27 ppcc between 19/1300-1900 UTC. Total IMF Bt was mostly weak, but with a few brief moderate intervals. Bz fluctuated between -7 nT and +8 nT. The Phi angle observed several rotations between positive (away from the Sun) and negative (toward the Sun) sectors. Resultant geomagnetic activity was Quiet to Unsettled (Kp 1-3), with a period of Active (Kp 4) 19/1500-2100UTC.

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) as measured by GOES-16 was at background levels, with no solar radiation storms observed. High energy electron flux (greater than 2 MeV) was at predominantly background levels, with a brief peak of 199 pfu at 19/1500 UTC. Associated 24-hour electron fluence remained well below the Active (1e8 integrated pfu) threshold, with 1.91e6 integrated pfu recorded at 19/2100 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to remain at Very Low levels during the forecast period, with only a slight chance of C-class flares.

Solar Wind / Geomagnetic Activity: Solar wind speeds are expected to begin day 1 (20th) at mainly background levels. However, the solar wind is likely to become enhanced at times during days 1 and 2 (20th and 21st) due to coronal hole influence from CH13/-. Geomagnetic activity is likely to be Quiet to Unsettled, with isolated Active intervals, and a slight chance of isolated G1 minor geomagnetic storms on days 1 and 2. Coronal hole influence is expected to gradually wane through days 3 and 4 (22nd and 23rd), with geomagnetic activity returning to mostly Quiet levels.

Energetic Particles / Solar Radiation: The high energy (greater than 10 MeV) proton flux is expected to remain at background levels, with no solar radiation storms expected. The high

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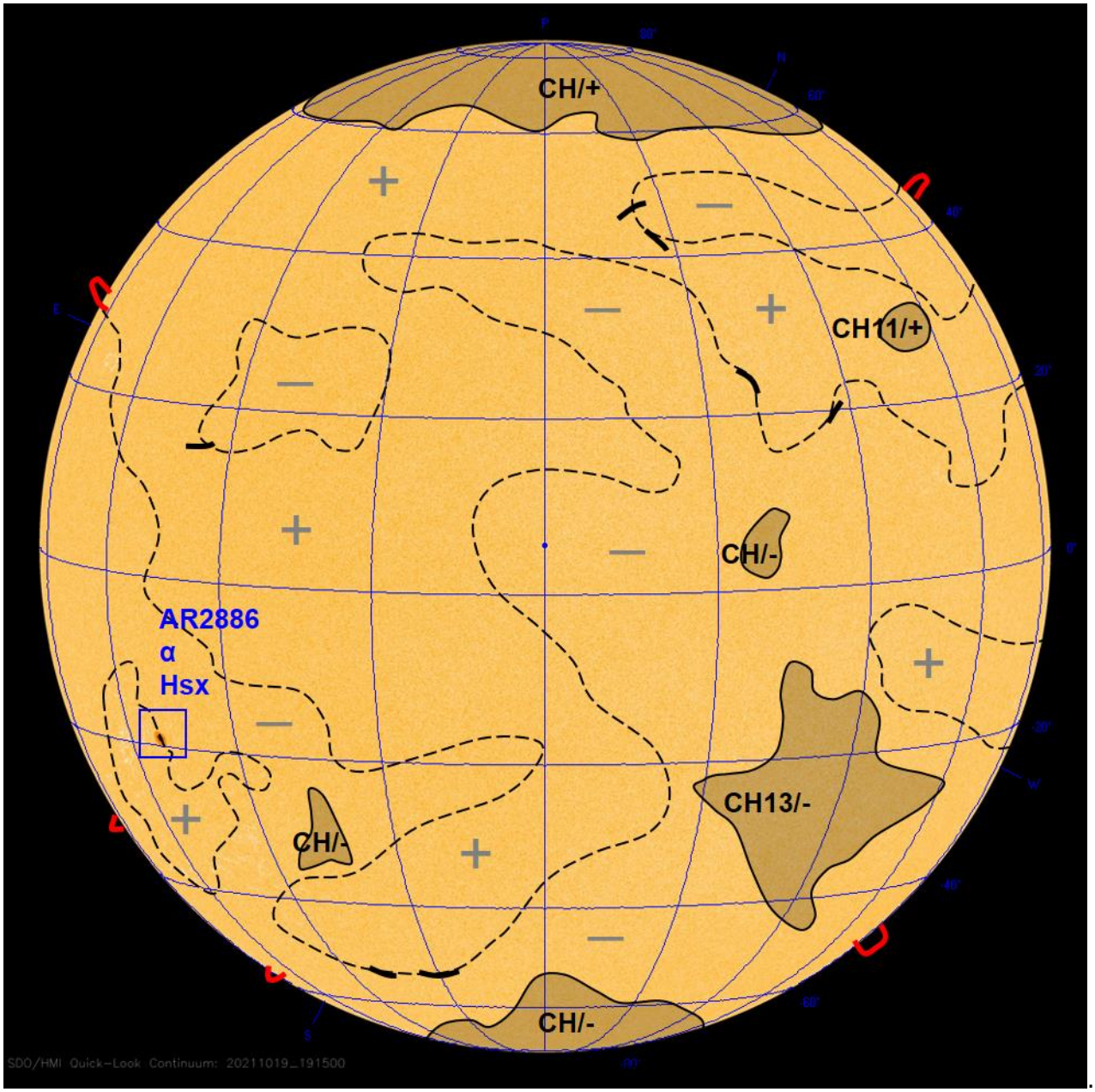
energy electron flux (greater than 2MeV) is expected to be at mostly background to moderate levels, but with an increased risk of high (>1000 pfu) levels from day 2 (21st) onwards. The 24-hour fluence will most likely remain below the Active (1e8) threshold throughout, but with a rising trend likely days 2 to 4 (21st to 23rd).

Figure 1. Solar Analysis Valid 19/2000 UTC.



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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Geomagnetic Storms:

A faint CME that was associated with a weak filament lift off from near N30W10 at 17/0739 UTC has been re-analysed. Model results show a possible small chance of a weak side glance around 20/2300UTC, but confidence is low and no significant impacts are expected.

Solar wind speeds are expected to begin day 1 (20th) at mainly background levels. However, the solar wind is likely to become enhanced at times during days 1 and 2 (20th and 21st) due to coronal hole influence from CH13/-. Geomagnetic activity is likely to be Quiet to Unsettled, with isolated Active intervals, and a slight chance of isolated G1 minor geomagnetic storms on days 1 and 2. Coronal hole influence is expected to gradually wane through days 3 and 4 (22nd and 23rd), with geomagnetic activity returning to mostly Quiet levels.

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	10	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Geomagnetic Activity - Earthbound Coronal Mass Ejections

Date/time 21.5R (UTC)	Halo: Full or Partial	Source	Source Location	Estimated Speed	Estimated Arrival Time	Comments
17/1506	Partial	Filament	N30W10	500	20/2300 UTC	Faint CME. Low confidence, only small chance of side glance. No significant impacts expected.

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Radio Blackouts - X-Ray Flares:

Solar activity is expected to remain at Very Low levels. There is one numbered sunspot region on the visible disc at present, AR2886 (Hsx/Alpha), located in the far southeast quarter. This region appears to be stable at present and has not produced any notable flares in the past 24 hours. A small area of plage in the far northeast may contain one very small, faint spot and will be monitored for any development. A brighter region of flux observed at the eastern edge of STEREO-A EUVI imagery (around S25 E115), should reach the east limb of the visible disc on the 22nd and will also be monitored.

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	1	1	1	1
Very Active	R3 to R5 X Class	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

With no significant flare activity forecast for this period, solar radiation storms are not expected.

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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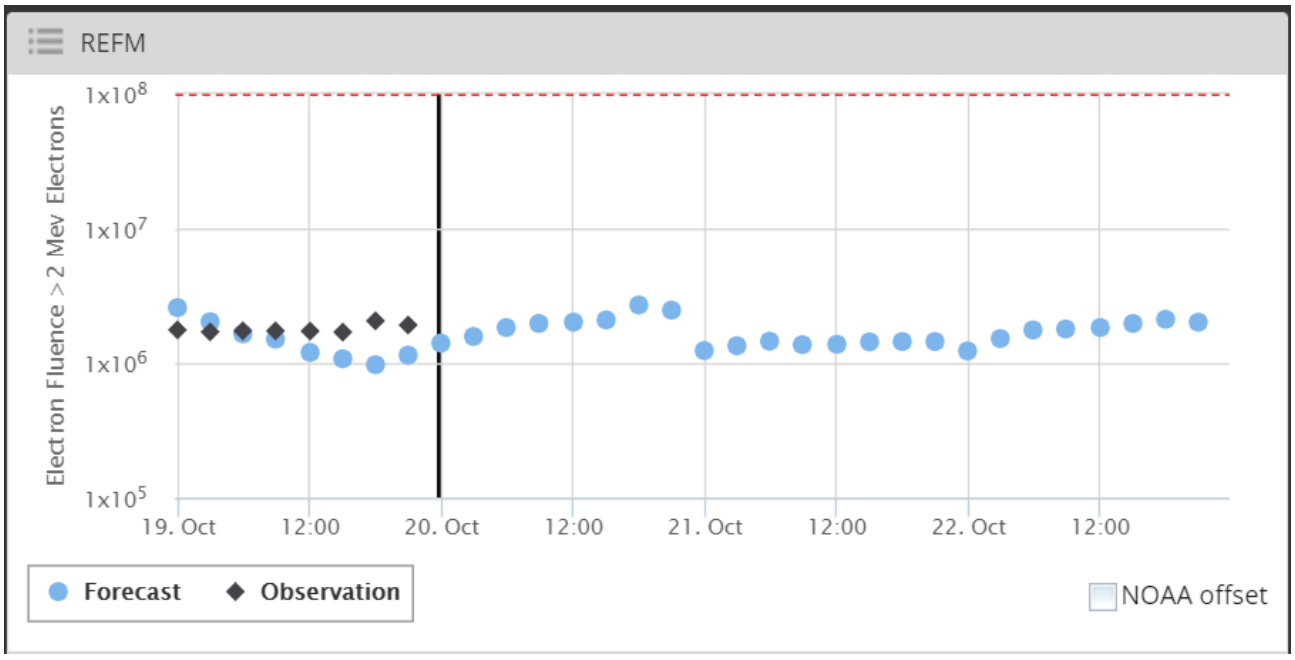
High Energy Electrons Event (≥ 2MeV):

The high energy (greater than 2 MeV) electron flux is likely to reach moderate levels through the diurnal cycle at first, and perhaps more generally later in the period, once any increased geomagnetic activity from anticipated coronal hole influences begin subsiding. However, the timing and strength of connection with the coronal hole high speed stream remains only moderate confidence, due to the differing size and location of CH13/- on this rotation. Associated electron fluence is expected to remain below the active threshold, but is likely to see a more significant rising trend later in the period.

GEO Electron Environment Probability (Exceedance)	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ 2 MeV ≥ $1x10^8$**	No	5	10	20	30
Very Active	**≥ 2 MeV ≥ $1x10^9$**	No	1	1	1	1

Figure 2: MOSWOC REFM latest output.



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